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A4K KFA  
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US 5652990 A US 4571768 A

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(54) Abstract Title  
**Electric toothbrush head**

(57) An electrically driven toothbrush has a brush holder 13 that is arranged to rotationally vibrate and carry a number of bristles 19 interspaced with arcuate membranes 23. The membranes serve to aid cleaning of the teeth and to polish the teeth surfaces during use of the toothbrush, and may be made of neoprene.

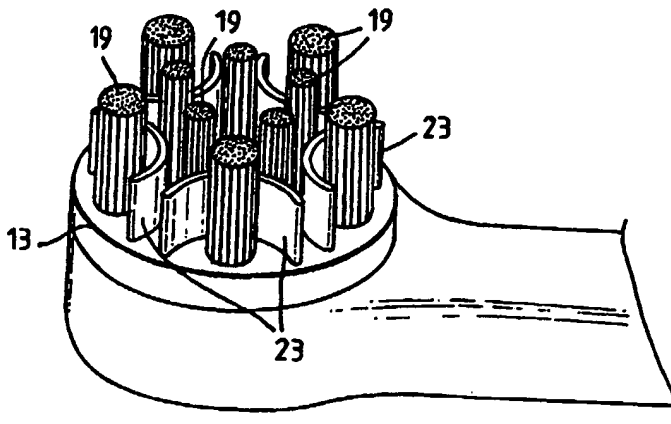


Fig. 5

GB 2 371 217

TOOTHBRUSH

The invention relates to toothbrushes.

5     The invention relates more particularly to electrically  
driven toothbrushes in which brush bristles are arranged  
to move relative to an elongate toothbrush handle such  
that the bristles rotate about an axis generally at  
right angles to a longitudinal axis of the handle. The  
10    bristles may rotate completely or preferably oscillate  
as fully described for example in USA Patent 5625916.

In certain conditions, the overall cleaning effect of  
such brushes is not wholly satisfactory, especially for  
15    polishing the teeth or removing stains.

It is an object of the invention to overcome or to at  
least reduce this problem.

20    According to one aspect of the invention there is  
provided an electrically driven toothbrush having an  
elongate handle and a brush head mounted to a remote end  
of the handle, a bristle holder rotatably mounted to the  
brush head to rotate about an axis generally at right  
25    angles to the longitudinal axis of the handle, including  
an array of upstanding bristles interspaced with a  
number of separate upstanding flexible membranes that  
are arranged such as to rub against surfaces of teeth

during brushing.

The membranes are preferably shorter than at least the longest of the bristles.

5

Each membrane is preferably arcuate in cross-section and partially surrounds a respective bristle of the bristle array.

10 Each membrane may be semi-circular in cross-section and positioned between a respective bristle and the rotational axis of the brush holder.

15 The membranes are preferably evenly distributed about the brush holder axis and each partially surround a respective peripherally sited bristle of the bristle array.

20 There are typically five membranes and at least ten bristles.

The membranes may be formed of plastic material.

25 According to another aspect of the invention there is provided a rotatable bristle holder for an electrically driven toothbrush having an array of upstanding bristles interspaced with a number of separate upstanding flexible membranes arranged such as to rub

against surfaces of the teeth during brushing.

An electric toothbrush according to the invention will now be described by way of example with reference to the accompanying drawings in which:-

Figure 1 is a sectional bottom view of the toothbrush;

Figure 2 is a cross-sectional side view of a brush head of the toothbrush;

Figure 3 is a plan view of Figure 2;;

Figures 4 is an enlarged top plan view of the brush head; and

Figure 5 is an isometric view of Figure 4.

Referring to the drawings, in Figure 1 the toothbrush comprises a handle portion 10 at a first end of the toothbrush, a brush head 11 at a second end of the toothbrush, a rotatable shaft 12 extending from the handle to the head, and a generally circular bristle holder 13. The handle provides compartments for holding an electric motor 14 and two batteries 15 and 16. A shaft coupling 17 is arranged to grip one end of the shaft 12 and allow the shaft to be pulled out for cleaning or replacement.

The head 11, as is better seen in Figure 2 supports a post 18 which provides a rotational pivot axis 40 for the bristle holder 13. Bristles 19 are shown for illustrative purpose only in Figure 2. The shaft 12 has  
5 an integrally formed remote-most end 20 that is off-set from a central longitudinal axis 21 of the shaft.

The remote-most end 20 fits a slot 22 (see Figure 3) formed in a side of the bristle holder 13. It will be noted that the end 20 points towards an intersection of  
10 the first axis 21 and a second central axis 40 of the post 18. When the shaft 12 is rotated by the motor 14, the remote end 20 describes a circle about the shaft 12 and drivingly engages the slot 22 to cause the bristle holder 13 to rotationally vibrate. As may be seen in  
15 Figure 3, the slot 22 is closed-ended and extends radially inward from the outer circumference of the holder to less than the distance to the centre of the holder. Thus, the holder 13 pivots or rotates forwards and backwards about the centre of the post 18. Such  
20 vibrations comprise the relative motion between the head 11 and the bristles 19 and is generally beneficial for efficient cleaning of teeth. The width of the slot 22 is preferably generally the same as the diameter of the end 20 to leave minimum play; this keeps noise to a  
25 minimum in use.

Figure 1 shows a toothbrush where the holder 13 vibrates or rotates through an angle of  $30^{\circ}$ . In Figure 2 the

angle is 35°. It will therefore be appreciated that the rotational angle can be chosen by fitting different shafts 12 and that the same bristle holder can be used for all angles. It is also possible to use the holder  
5 13 in a toothbrush where the holder is oscillated through 60° or 120° or rotated through 360° in continuous rotation.

The described shaft 12 is preferably integrally formed.  
10 i.e., a single length of a thin rod and shaped as shown. However, it is possible to arrange for the remote end 20 to be separately formed or provided and fixed to a straight end part of the shaft. Such a separate part can be a brush having a central axis coinciding with the  
15 axis 21 of the shaft and an off-centre driving post. The driving post then takes up the position and function of the remote end 20. Thus, the driving post and the slot 22 then form the driving engagement between the shaft and the holder 13 and so the driving post can be  
20 regarded as the remote end of the shaft.

As shown in Figure 4 and 5, the brush holder 13 carries ten bristles that are interspaced by four flexible membranes 23. Each membrane is generally semi-circular  
25 in cross-section and partially surrounds a respective bristle mounted adjacent the periphery of the brush holder. The membranes 23 are positioned between the respective bristles and the central axis 40 of the brush

holder. In such a configuration, the membranes are inherently unlikely to become clogged up with toothpaste or debris removed from the teeth.

5 The peripheral bristles are preferably thicker than the inner bristles which may be shorter in length than the peripheral bristles. The membranes 23 are generally shorter than all the bristles and typically protrude up about 50% to 90% of the height of the bristles they  
10 partially surround. The membranes are formed of food-safe plastics material such as neoprene or other synehetic rubber, but may be made of woven fabric or similar.

15 The membranes rub against the surfaces of the teeth and serve to polish surfaces of the teeth and remove stains during use. The membranes may be reasonably effective in this respect if they are generally rectangular in cross-section, or completely or more completely,  
20 surround than shown in the Figures, some or all of the bristles.

CLAIMS:

1. An electrically driven toothbrush having an elongate handle and a brush head mounted to a remote end of the handle, a bristle holder rotatably mounted to the  
5 brush head to rotate about an axis generally at right angles to the longitudinal axis of the handle, including an array of upstanding bristles interspaced with a number of separate upstanding flexible membranes that  
10 are arranged such as to rub against surfaces of teeth during brushing.

2. An electrically driven toothbrush according to claim 1, in which the membranes are shorter than at  
15 least the longest of the bristles.

3. An electrically driven toothbrush according to claims 1 or 2, in which each membrane is arcuate in cross-section and partially surrounds a respective  
20 bristle of the bristle array.

4. An electrically driven toothbrush according to claims 1 or 2, in which each membrane is semi-circular in cross-section and positioned between a respective  
25 bristle and the rotational axis of the brush holder.

5. An electrically driven toothbrush according to claim 4, in which the membranes are evenly distributed



about the brush holder axis and each partially surround a respective peripherally sited bristle of the bristle array.

5        6.    An electrically driven toothbrush according to claim 5, in which there are five membranes and at least ten bristles.

10       7.    An electrically driven toothbrush according to claims 1 to 6, in which the membranes are formed of plastic material.

15       8.    A rotatable bristle holder for an electrically driven toothbrush having an array of upstanding bristles interspaced with a number of separate upstanding flexible membranes arranged such as to rub against surfaces of the teeth during brushing.

20       9.    An electrically driven toothbrush and a bristle holder substantially as herein described with reference to the accompany drawings.



INVESTOR IN PEOPLE

Application No: GB 0100435.7  
Claims searched: 1-9

Examiner: Brian B Caswell  
Date of search: 8 May 2001

## Patents Act 1977 Search Report under Section 17

### Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.S): A4K (KFA; KBC)

Int Cl (Ed.7): A46B

Other: Online databases: WPI; EPODOC; JAPIO

### Documents considered to be relevant:

| Category | Identity of document and relevant passage | Relevant to claims |
|----------|-------------------------------------------|--------------------|
| A        | US 5652990 (DRIESEN)                      |                    |
| A        | US 4571768 (KAWASHIMA)                    |                    |

|   |                                                                                                           |   |                                                                                                                  |
|---|-----------------------------------------------------------------------------------------------------------|---|------------------------------------------------------------------------------------------------------------------|
| X | Document indicating lack of novelty or inventive step                                                     | A | Document indicating technological background and/or state of the art.                                            |
| Y | Document indicating lack of inventive step if combined with one or more other documents of same category. | P | Document published on or after the declared priority date but before the filing date of this invention.          |
| & | Member of the same patent family                                                                          | B | Patent document published on or after, but with priority date earlier than, the filing date of this application. |

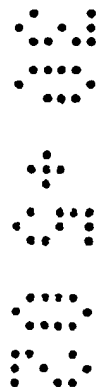
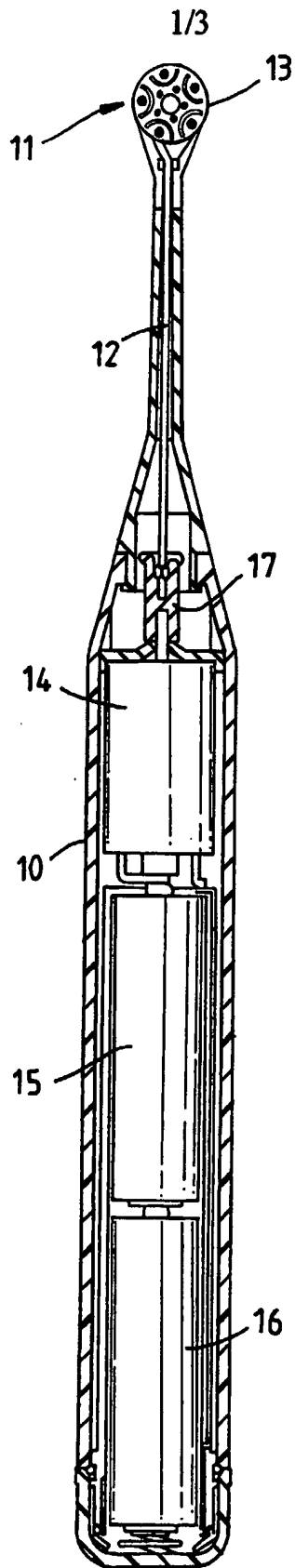


Fig. 1

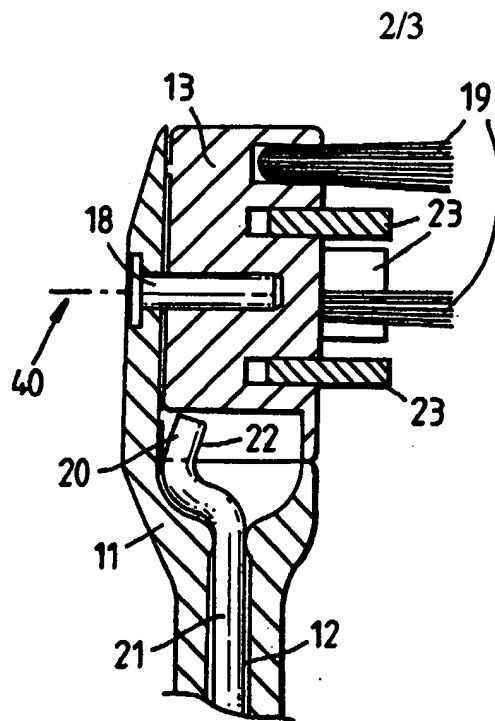


Fig. 2

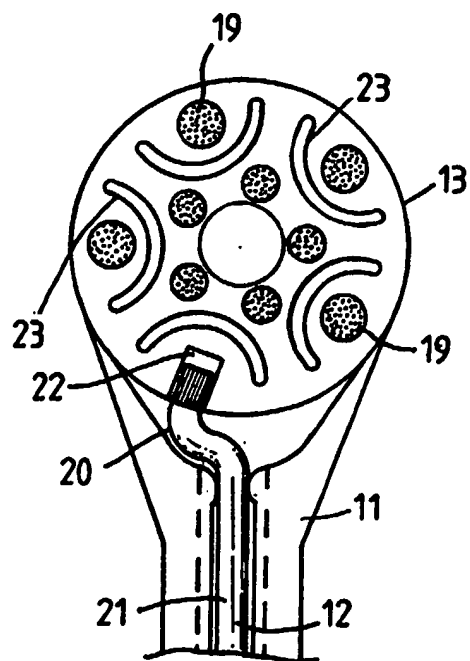
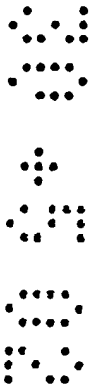


Fig. 3



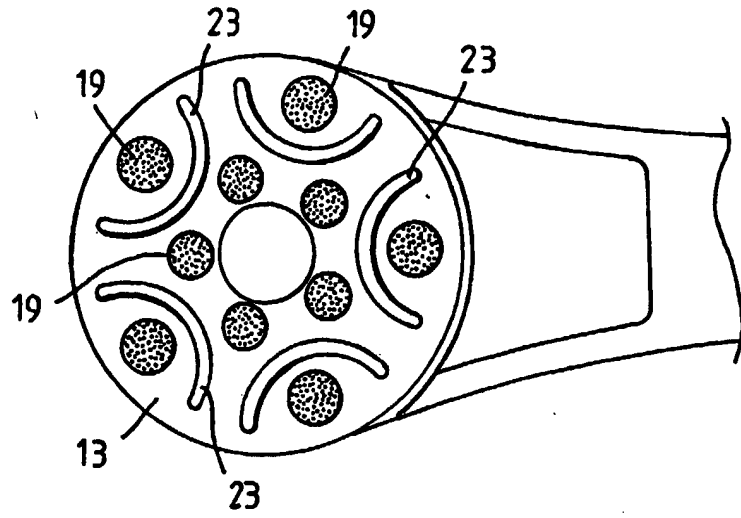


Fig. 4

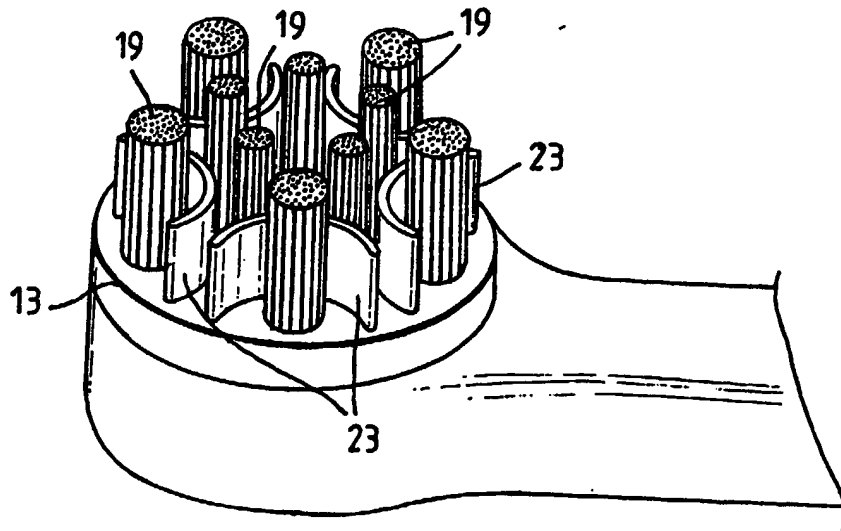


Fig. 5